App. No. 09/630,479
Docket No. 63,937-104

CLAIMS PENDING

1-20. (Canceled)

21. (Currently Amended) An optical system for producing an image of the surface of an object, said object having a characteristic, temperature-dependent, dominant, self-emitted EMR spectrum, comprising:

an EMR source for projecting electromagnetic radiation toward said object;

an EMR detector for selectively detecting a spectrum component of said projected EMR, said component being reflected by the surface of said object and being directed toward said EMR detector;

an airflow controller to provide airflow at a preselected temperature around said hot object to decrease a temperature gradient to remove air density distortion; and

wherein said projected electromagnetic radiation has a wavelength which is selected as a function of object temperature and material, said reflected component of said projected EMR has said [[a]] wavelength that is different than said self-emitted, dominant EMR spectrum such that the reflected component can be distinguished from said self-emitted EMR based on wavelength and wherein said optical system further includes an interference filter in association with said EMR detector configured to pass said wavelength and block self-emitted EMR.

22. (Canceled)

23. (New) An optical system as recited in claim 21, further including a frequency modulator in association with said EMR source for modulating the frequency of said projected EMR and further including a demodulator in association with said EMR detector.

24. (New) A method of imaging the surface of a hot object having a characteristic, dominant, self-emitted electromagnetic radiation (EMR) spectrum comprising the steps of:

(A) defining a highest temperature, **T**, of the object during imaging;

(B) defining an object emissivity ε (T, material) that is a function of the highest temperature T and material of the object;

(C) obtaining a self-emitted electromagnetic radiation spectrum R (λ, T, material) based on a black body radiation function I (λ, T),

and the object emissivity ε (T) in accordance with $R(\lambda, T, material) = \varepsilon(T, material) \cdot I(\lambda, T)$ wherein:

$$I(\lambda, T) = \frac{2\pi c^2 h}{\lambda^5} \bullet \frac{1}{e^{hc/\lambda\kappa T} - 1}$$

and where

Π	=	pi
C	=	light speed
h	=	Planck's constant
λ	=	wavelength
κ	=	Boltzmann constant
ε	=	emissivity function of temperature, empirically obtained.

(D) selecting a cut-off wavelength λ cut-off such that the self-emitted electromagnetic radiation spectrum $R(\lambda_{cut\text{-}off}, T)$ is small compared to a signal intensity of an external, illuminating light $\eta(\lambda_{ill})$, in accordance with:

$$\gamma = \frac{\eta(\lambda_{ill})}{R(\lambda_{cut-off}, T)} \geq \gamma_o$$

where:

η(λ)	=	the intensity of the external illuminating light @ wavelength λ.
γ_{ill}	=	the wavelength used for external illumination.
γ	=	signal to noise ratio between the external illuminating light intensity and the self-emitted light intensity.
γ_o	=	specified signal to noise ratio limit that will satisfy the application.

(E) determining the longest acceptable wavelength γ_{ill} for the external illumination;

(F) projecting light with a wavelength less than or equal to γ_{ill} toward the hot object;

(G) detecting the projected light as reflected from the hot object to thereby image the hot object.